Where Does the Rain Go?

Activity 4: Soak it Up!

Goal

- To determine the best material for infiltration by quantitative measurements.
- To understand the importance of natural “buffers” along waterways.

Materials

- ✓ 3 baking pans
- ✓ 2 cup measuring container (or 500 ml)
- ✓ 3 coffee cans or 3 flower pots
- ✓ Aluminum foil
- ✓ Can opener
- ✓ Hammer & nail or ice pick/knife
- ✓ Soil
- ✓ Gravel
- ✓ Plant
- ✓ Water
- ✓ Soak It Up! Data Form

Voluntary State Curriculum

1.0 Skills and Processes
A Scientific Inquiry: 1, 4, 6, 2
B Critical Thinking: 5

Time 45 – 60 minutes

Background

In a natural forest setting there are many “buffers”. Buffers do two important things: they slow the flow of rainwater into a stream and they filter pollutants from the water.

Buffers such as trees, shrubs, weeds, and tall grasses all help to protect the soil from being washed into the stream. They keep the rain from hitting the soil directly. The roots hold the soil and keep it from washing away. Most of the rain soaks into the soil. Very little water runs right into the stream.

When rainwater has a chance to soak into the ground, the soil filters out many of the pollutants the rain collected. This reduces the pollution that enters the streams and rivers.

When areas are developed, most of the natural buffers disappear. Rain hits hard surfaces (concrete, asphalt, roofs) that cannot absorb the water. The rain runs off very quickly downhill and toward the stream.

Why is runoff bad for the stream? Runoff carries pollutants into the streams that make the water unfit for plants and animals. Some examples of pollutants include: air pollution such as sulfur and nutrients, pet wastes, fertilizer, pesticides, oil, and toxic metals from cars, rainspouts and paint. Run off causes more flooding and floods occur more often. It increases stream erosion. Less water soaks into the ground and into the stream channel. The stream level falls or may even dry during times when there is no rain. Runoff can also change the temperature of the stream. As the rain flows over roads on a warm day, it gets very warm. Many plants and animals that need cool temperatures to live cannot survive.

Buffers help prevent pollution, floods, erosion, and temperature changes from affecting streams.

Vocabulary

Buffers – trees, shrubs, weeds and tall grasses planted along a stream.

Runoff – water that hits hard surfaces (concrete asphalt, roofs), is not absorbed in the soil and runs quickly downhill into a stream.

Erosion – the wearing away of soil by rain, wind, water or ice.

Headwaters – small streams that are sources of water.

Algae – microscopic plants.

Riffles – fast flowing shallow areas.

Sediment – soil in streams.

Stream bank – side of stream.

Velocity - speed

Motivation

Review “The Natural Stream Environment”
Read “Where Does the Rain Go?”

Procedure

This activity can be done as a demonstration individually or by students in a small group.

1) Prepare containers ahead of time or have students do it. (Use either coffee cans or flower pots.)

   Coffee can: Remove one end with a can opener and punch several holes in the opposite end using the hammer and nail or ice pick.

   Flower pot: Remove saucer and make sure it has several drainage holes.

2) Prepare filters. Fill one can ¾ full with a mixture of soil and gravel. Wet the soil so that it is damp but not saturated. Fill the second can with the plant and soil so it is ¾ full. Wet the soil but do not saturate it. In the third can, place several loose clumps of aluminum foil.

3) Place each can in individual baking pans to collect the water that drains through the coffee can or flower pot.

4) Explain the following procedure and have students predict the final amounts collected for each pan on their Soak It Up! Activity sheet.

5) Pour two cups (16 oz.) or 500 ml of water into each pot.

6) After two minutes, quickly pour the water that has collected in the baking pans back into the measuring cup. Return the pan to collect further drainage. Record the amount collected and discard the water.

7) While waiting for next measurement, talk about the differences observed. Relate observations to what happens to rainwater. What kinds of surfaces will absorb water and filter it slowly? What kinds of surfaces will cause excessive runoff? Why is runoff bad for the stream? Think of your community: What does the rain fall on? What does it mean for your local stream?

8) After eight more minutes, measure what is collected. Record the results and answer questions.

Modifications

- Work with a partner.

Assessment

- Participation (discussion and/or group activity)
- Successfully completed bar graph.

Wrap Up

- Clean up materials. Do not pour sediments down the drain.
- Discuss the results of eight minute measurements and totals.
- Why is the rate of infiltration or runoff important to streams? (Slow infiltration helps purify water; runoff can carry pollutants with it; heavy flows of water into a stream cause erosion; heavy runoff can cause temperature of a stream to rise.)

Optional Challenges/Extensions

- Do two more trials and compute the average. Does the infiltration capacity change after several "rainfalls"?
- Make a bar graph of the results for total drainage.
- Journal.
- Project Wet Activities: Imagine, The Incredible Journey, Just Passing Through, Poetic Precipitation, The Rainstick, Stream Sense, The Thunderstorm, Water Match, Water Models, Where are the Frogs?
- Healthy Water, Healthy People Activities: Pollution-Take it or Leave it, A Snapshot in Time, From H to OH!